A NEW FOSSIL PENGUIN FROM AUSTRALIA

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Introduction

Four isolated specimens of fossil penguins have been previously described in print, 2 from the Blanche Point marls, considered late Eocene by Glaessner, and 2 from the Gambier limestone, considered Oligocene (Glaessner 1955, Simpson 1957). A fifth specimen was found in 1950 by Edmund D. Gill of the National Museum of Victoria and has been referred to me for description through the courtesy of Mr. Gill and that Museum. It is of exceptional interest because its age is different from the previously described Australian specimens and because it represents a definable new genus and species. The field occurrence and age are discussed by Mr. Gill in a separate paper.

Classification

Family Spheniscidae

Genus **Anthropodyptes** gen. nov.

Type: *A. gilli.*

Known Distribution: Miocene, Australia (as for the species).

Diagnosis: Large extinct penguins. Humerus rather slender and elongate, shaft slightly sigmoid, with definite but moderate preaxial angle. Proximal part of shaft distinctly narrower (preaxial-postaxial) than distal part. Tricipital fossa undivided, large especially proximo-distally. Pectoralis secundus insertion wide, little oblique, almost parallel to long axis of shaft. Angle of axis of shaft with tangent to ulnar and radial condyles about 42°. Ulnar condyle only slightly ventral to radial condyle and broader than the shelf dorsal to it.

Anthropodyptes gilli sp. nov.

Type: National Museum of Victoria (registered number P17167). Right humerus nearly complete but lacking most of the head and the small distal postaxial-dorsal process (dorsal to the dorsal sesamoid groove). Found by Edmund D. Gill, for whom the species is named.

Hypodigm: Type only.

Horizon and Locality: Balcombian, Miocene (see separate paper by Gill). E. bank of Glenelg R., S. end of Devil's Den, N. of Dartmoor, western Victoria, Australia.

Diagnosis: Sole known species of the genus.

Measurements

Length from distal end of Pectoralis secundus scar to angle at the base of the dorsal sesamoid groove (dimension 3 in Marples 1952) : *c.* 114 mm.

Least preaxial-postaxial width on proximal part of shaft: 28·3 mm.

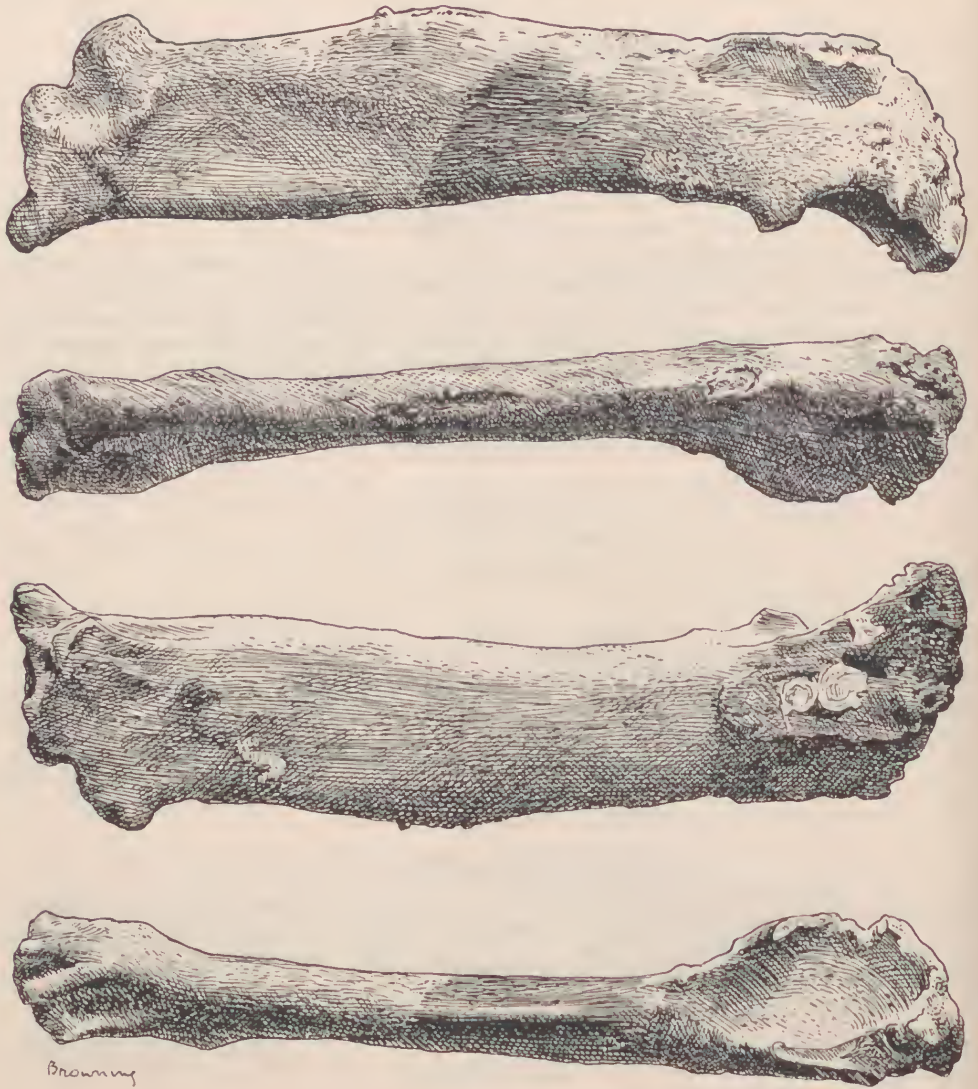Least preaxial-postaxial width on distal part of shaft: 30·2 mm.

B

Fig. 1.—*Anthropodyptes gilli* Simpson. Type, National Museum of Victoria P17167. Right humerus in ventral, preaxial, dorsal, and postaxial aspects, × c. ⅞, reading upwards. (Drawing by Browning, from National Museum of Victoria.)

Preaxial-postaxial width at 1/3 length (estimated) from head (Marples's 5) : 28·6 mm.

Preaxial-postaxial width at 2/3 length (estimated) from head (Marples's 6) : 31·4 mm.

Dorsoventral thickness at 1/3 length (Marples's 7) : 14·1 mm.

Dorsoventral thickness at 2/3 length (Marples's 8) : 11·9 mm.

Angle between midline of shaft and a tangent to the ulnar and radial condyles, in orthogonal projection of dorsal or ventral view (shaft-condyle angle) : 42°.

Comparisons

Detailed description seems unnecessary, because the characteristics of the specimen are sufficiently evident in the preceding generic diagnosis, accompanying illustrations, and following comparisons. Comparisons with other Australian fossils have been with casts, with New Zealand and Seymour Island forms with figures and descriptions (Marples 1952, 1953; Wiman 1905), and with Patagonian forms mostly with original specimens but in part with figures and descriptions (Ameghino 1905). The impossibility of comparing originals in all cases may well have resulted in overlooking real differences among the specimens. It is less likely to have falsified the differences that have been noted.

Australian Forms

Of the two penguin humeri previously described from Australia (Simpson 1957), one belongs to the genus *Palaeeudyptes,* which is best known from New Zealand so that comparison will be based mainly on specimens from the latter country. The other, South Australian Museum P10863, is so poorly preserved as to make comparison incomplete. The prexial tubercle is similar to that of the present specimens and there is a similar but less marked and less proximal narrowing of the shaft above it. The tricipital fossa is smaller and strikingly less elongate proximo-distally. In spite of some resemblances and possible affinity, it is unlikely that the two specimens are congeneric. S.A.M.P10863 was considered as possibly belonging to a new genus, which was not named, however, because of the inadequacy of the evidence.

New Zealand Forms

Palaeeudyptes, as described and figured by Marples (1952), is distinct from the present form in the following characters, among others : absence of preaxial tubercle, proximal and distal parts of shaft about equal in preaxial-postaxial width or narrowest point distal, tricipital fossa smaller and shorter proximo-distally, ulnar condyle more ventral in position and shelf dorsal to it wider. The genera are distinct and probably have no special relationship.

The humerus of *Duntroonornis* is poorly known and unfigured, but the statement (Marples 1952, p. 42) that it probably lacks a preaxial angulation is an important distinction from the present form. The humerus is unknown in *Korora.* The only known species is much smaller than that represented by the present specimen.

Both *Pachydyptes* and *Platydyptes* have the humerus notably stouter (relative to length) than in *Anthropodyptes.* In *Pachydyptes* the proximal and distal preaxial-postaxial widths are almost exactly equal but in *Platydyptes* the proximal width is the lesser, in almost the same proportion as in *Anthropodyptes.* For ratios demonstrating these proportions see Table 1. In *Pachydyptes* the Pectoralis secundus insertion is apparently more oblique than in *Anthropodyptes,* the shaft is somewhat less curved, and the preaxial angle is less distinct. In *Platydyptes* the preaxial angle is less distinctive, but the Pectoralis secundus insertion is also rather oblique and the

angle between the shaft and a tangent to the condyles is greater. These lesser dis-
tinctions have unknown variability and may not all stand up as truly diagnostic, but
the massive humeri of *Pachydyptes* and the closely similar *Platydyptes* are decisively
different in aspect from that of *Anthropodyptes*.

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TABLE 1

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Comparison of Some Proportions of Humeri of Fossil Penguins
A = Length from distal end of Pectoralis secundus insertion to angle at the base of the
      dorsal sesamoid groove (Marples's 1952, dimension 3).
B = Preaxial-postaxial diameter 1/3 of distance from head (Marples's 5).
C = Same at 2/3 of distance (Marples's 6).
Based on measurements by Marples (1952), except *Anthropodyptes* (on original specimen),
and *"Arthrodytes" andrewsi* (on figure by Ameghino 1905).

	A/B	A/C	B/C
New Zealand:			
Palaeeudyptes antarcticus	3.5[a]	3.7[b]	1.04[c]
Pachydyptes ponderosus	2.6	2.5	1.00[d]
Platydyptes novaezealandiae ..	2.8	2.5	0.88[e]
———— *amiesi*	2.7	2.5	0.90
Archaeospheniscus lowei	c. 3.6	c. 3.1	c. 0.87
Australia:			
Anthropodyptes gilli	4.0	3.6	0.91
Seymour Island:			
Anthropornis nordenskiöldi ..	c. 3.1	c. 2.9	0.94
Eosphaeniscus gunnari	c. 3.5	3.9	c. 1.13
Patagonia:			
"Arthrodytes" andrewsi	3.2	2.8	0.88

  a. Mean of five specimens. Range 3.4 – 3.6.
  b. Mean of five specimens. Range 3.5 – 3.8.
  c. Mean of six specimens. Range 1.00 – 1.07.
  d. Mean of three specimens. Range 0.98 – 1.02.
  e. Mean of two specimens. Range 0.85 – 0.91.

On the whole, *Archaeospheniscus* resembles *Anthropodyptes* more closely in the
humerus than does any other known New Zealand form. There are, nevertheless,
numerous small differences which, in sum, seem to exclude generic identity. The
humerus is more slender in *Archaeospheniscus* than in other New Zealand genera,
but still is distinctly less slender than in *Anthropodyptes*. Marples's (1952) Table 3
gives the proximal preaxial-postaxial width (his dimension 5) as 19 mm. in a speci-
men of *A. lowei* which would make the humerus phenomenally slender, but this
agrees neither with his description nor his figures (Fig. 6 and Pl. II) and is cer-
tainly a *lapsus*. The illustrations suggest a value of about 24 mm. (which, incidentally,
could readily be mistaken for 19 in reading the calipers; 29 is not at all likely), and I
have used that figure in compiling my Table 1. The shaft-condyle angle may be larger
in *Archaeospheniscus* than in *Anthropodyptes* and the Pectoralis secundus scar is
definitely more oblique. The concavity of outline distal to the preaxial angulation is
more pronounced and there is a more distinct postaxial angulation, so that the shaft
as a whole is decidedly more sigmoid. Both known species of *Archaeospheniscus* are
significantly smaller than *Anthropodyptes gilli*.

SEYMOUR ISLAND FORMS

(Wiman 1905, and Marples 1953). The humerus is unknown in *Delphinornis* and *Ichthyopteryx*. Both are based on species very much smaller than *Anthropodyptes gilli,* and while this does not preclude generic identity it does make it unlikely, as does also the decided difference in locality and, with high probability, ecology. The *Notodyptes* humerus is known only from a doubtfully referred scrap, which also represents a smaller animal and shows the proximal part of the shaft as slender and tapering in a way not seen in *Anthropodyptes.*

The humerus of *Anthropornis* has a stouter shaft than in *Anthropodyptes,* a much more acute shaft-condyle angle, and a less distinct preaxial angulation, in spite of which the shaft is more sigmoid. The preaxial-postaxial width is practically the same at 1/3 and 2/3 distance from the head. In *Eosphaeniscus* the shaft is decidedly narrower distally, in more marked distinction from *Anthropodyptes,* and the shaft-condyle angle is also more acute. The *Eosphaeniscus* humerus is especially characterized by a peculiar ridging postaxial to the Pectoralis secundus scar, absent in *Anthropodyptes.*

There seems to be no reason to suspect special affinity between the Australian and any of the known Seymour Island forms.

PATAGONIAN FORMS

The Patagonian penguins, all from a single widespread deposit (latest Oligocene or, more probably, early Miocene) constitute the largest known fossil penguin fauna. (See especially Simpson 1946.) Nevertheless, that fauna contains few elements that are closely comparable with other fossil penguins, those from Australia, New Zealand, and Seymour Island. Detailed comparison with the most common Patagonian forms, *Palaeospheniscus, Paraptenodytes,* and their respective synonyms or fairly close relatives, seems superfluous, as they are manifestly distinct from *Anthropodyptes.* The humeri that do require wider comparison are those of *Isotremornis nordenskjöldi* and *"Arthrodytes" andrewsi.*

Ameghino's figure (1905) of the humerus of *Isotremornis nordenskjöldi* looks remarkably like the New Zealand *Platydyptes amiesi.* It would be unwarranted to aver specific or generic synonymy without more detailed and direct comparison, but the possibility should be looked into. (Note, too, that *P. amiesi* is one of the geologically youngest of New Zealand fossil penguins; it is still perhaps older than *Isotremornis,* but the difference in age is not great.) By the same token, the short, heavy humerus of *Isotremornis* does not closely resemble that of *Anthropodyptes.*

It is uncertain and indeed improbable that the humerus called *Arthrodytes andrewsi* by Ameghino really belongs to *Arthodytes.* In 1946 I suggested that it might possibly belong to an otherwise unnoted species of *Paraptenodytes,* but on reconsideration I think that it cannot possibly be placed in the latter genus. The *"A." andrewsi* humerus is as much like that of *Anthropodyptes* as any known from Patagonia, but here, too, generic identity seems to be excluded. The *"A." andrewsi* humerus is shorter than that of *Anthropodyptes gilli* but heavier, larger in all transverse dimensions, both absolutely and relative to the length. The preaxial angle is much more produced, is relatively more distal, and the contour below it is more sharply concave, almost notchlike. The Pectoralis secundus scar is more oblique, and the shaft-condyle angle is less acute.

Discussions and Conclusions

There are about 17 or 18 previously known genera of fossil penguins, the exact number being indefinite because the validity of several proposed genera is in doubt.

The humerus is known, at least in part, in 14 probably valid genera and unknown in 3 or 4. It is unlikely on indirect evidence and grounds of distribution that any of the latter is synonymous with *Anthropodyptes* but obviously the possibility cannot be absolutely excluded. It is not practicable at present to insist that genera and species of fossil penguins be based only on homologous and universally comparable parts. That has not been done in the past and insistence on it would deprive us of names for many specimens that are nevertheless important and distinctive. So long as a type specimen is comparable with a majority of previously named taxa and is clearly distinct from them, it seems well justified to run a slight risk of creating a synonym.

Preceding comparisions have shown that the type of *Anthropodyptes gilli* is different from any previously named humeri in characters such as have commonly been used to define genera of fossil penguins. The differences, on the whole, are greater than those occurring among the humeri of established living genera of penguins.

Anthropodyptes does not show any unmistakable signs of special affinity with any previously named genus. Its humerus is perhaps most like that of *Archaeospheniscus* from the Duntroonian (purported early Oligocene) of New Zealand, but emphasis on other characters might yield a different opinion and it is by no means certain at present that degree of resemblance in the humerus is a precise measure of relationship.

All the fossil penguins are referred at present to the extant family Spheniscidae. Several attempts at supergeneric grouping have been made, but none is really satisfactory. I (Simpson 1946) suggested division primarily on the tarsometatarsus and secondarily on the humerus into Palaeospheniscinae, Paraptenodytinae, Anthropornithinae, Palaeeudyptinae, and Spheniscinae. *Anthropodyptes* could not enter into any of these subfamilies precisely as originally defined, but could be placed either in the Paraptenodytinae or in the Anthropornithinae with only such slight modification of definition as commonly follows discovery of new forms.

Marples (1952) showed that some points of my original definition do not apply to certain New Zealand specimens. He proposed to divide the family into Palaeeudyptinae and Spheniscinae only, and gave definitions based jointly on coracoid, humerus, and patella. Both classifications or either one may have a certain descriptive, pragmatic, or heuristic value, but neither one is likely to prove really natural or to be satisfactory when the group is better known. Some points in Marples's definition of the Palaeeudyptinae are not true of specimens that he referred, nevertheless, to that subfamily. For instance, it is not true of any known humeri of *Platydyptes* or of *Archaeospheniscus* that the "shaft of humerus [is] of even width or narrower distally". Moreover, the coracoid and patella are unknown in a great majority of the species and genera referred to the subfamily defined largely on characters of those bones.

Marples did not list explicitly all the genera placed by him in his two subfamilies. His evident intention, however, was to unite most (probably all) of the usually large New Zealand and Seymour Island fossil penguins in the Palaeeudyptinae, while most (perhaps all) of the generally smaller Patagonian fossil penguins were placed in the Spheniscinae with the recent forms. When the commoner or, especially, the extreme forms of the two groups are compared, this arrangement signalizes a distinction in general aspect or in morphological facies. It is difficult or impossible, nevertheless, to find absolutely diagnostic characters universally present in one group and absent in the other.

In this facies arrangement *Anthropodyptes* should probably be placed with the Palaeeudyptinae of Marples. The group is highly diverse morphologically, more so than all the recent penguins together. It doubtless includes a variety of phyletic lines

and branches which, however, cannot be or at least have not been clearly identified from materials now known. The group probably has primitive characters, almost surely with respect to recent forms and perhaps with respect to the smaller Patagonian fossils, but given some degree of primitiveness the resemblance seems to me probably adaptive and correlated with the large size of these species. It is not, or not wholly, correlated with greater age. The group occurs from Eocene into Miocene in Australia and into middle Oligocene, at least, in New Zealand without detected progressive change. The large Seymour Island penguins are of doubtful age but probably are Miocene or in any event no older than late Oligocene. Moreover, forms that surely resemble this group more than they do the Spheniscinae occur, although rarely, along with smaller species in the Patagonian late Oligocene or, more probably, early Miocene: *Isotremornis* and *"Arthrodytes" andrewsi*. The Patagonian *Paraptenodytes* (with some dubious relatives) is intermediate in size and also in morphological facies.

The smaller Patagonian fossil penguins, species of *Palaeospheniscus* and its apparent allies, cover much the same size range as recent penguins. As Marples has emphasized by referring them to the Spheniscinae, they also resemble the recent penguins in morphological (I would infer, adaptive) facies more than do the larger extinct species. Nevertheless, they have numerous and apparently important structural differences from recent penguins (even more in some other bones than in the humerus) and not all of these characteristics are likely to be merely primitive and ancestral (Simpson 1946).

A single species, *Palaeeudyptes antarcticus*, is reported (Marples 1952) as ranging from late Eocene to middle Oligocene in New Zealand, and the same species, or one very like it, occurs in the late Eocene of Australia (1957). Apart from that, there are no genera now recorded as common to any two of the four broad regional occurrences of fossil penguins. Except for *Palaeeudyptes* and for *Platydyptes* in the immediately successive Oligocene Duntroonian and Waitakian (Marples 1952), the successive finds of penguins in Australia and New Zealand also have no known genera in common. *Anthropodytes* raises to 3 the number of known successive occurrences in Australia, extends these upward into the Miocene, and represents a new, definable genus that is peculiar to Australia as far as yet known.

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   [Note that figures 5 and 6, but not the legends nor text references, have been reversed in this publication.]
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